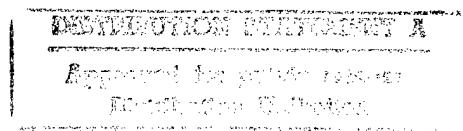


November 1997

## DEPARTMENT OF ENERGY

### Information on the Tritium Leak and Contractor Dismissal at the Brookhaven National Laboratory



19971118 017

DTIG QUALITY INSPECTED 3

---

Resources, Community, and  
Economic Development Division

B-276754

November 4, 1997

The Honorable F. James Sensenbrenner, Jr.  
Chairman  
The Honorable George E. Brown, Jr.  
Ranking Minority Member  
Committee on Science  
House of Representatives

As requested, we reviewed the events surrounding the leak of the radioactive element tritium from a research reactor at the Brookhaven National Laboratory (BNL) and the resulting termination of Associated Universities, Inc. (AUI), as the laboratory's contractor.<sup>1</sup> BNL is a federally funded research facility located in Suffolk County, Long Island, New York, that is owned by the Department of Energy (DOE). AUI is a not-for-profit corporation that has operated the laboratory since it was created in 1947. In January 1997, ground water samples taken by BNL staff revealed concentrations of tritium that were twice the allowable federal drinking water standards—some samples taken later were 32 times the standard. The tritium was found to be leaking from the laboratory's High Flux Beam Reactor's spent-fuel pool into the aquifer that provides drinking water for nearby Suffolk County residents.

DOE's and BNL's investigation of this incident concluded that the tritium had been leaking for as long as 12 years without DOE's or BNL's knowledge. Installing wells that could have detected the leak was first discussed by BNL engineers in 1993, but the wells were not completed until 1996. The resulting controversy about both BNL's handling of the tritium leak and perceived lapses in DOE's oversight led to the termination of AUI as the BNL contractor in May 1997. In response to DOE's investigation and other factors, you asked us to further examine these issues. As agreed with your offices, we

- identified the events leading up to discovery of the tritium leak,
- evaluated why these events occurred, and
- determined the reasons used by the Secretary of Energy to terminate DOE's contract with AUI.

---

<sup>1</sup>AUI's contract is terminated as of November 3, 1997, or until a new contractor assumes responsibility for the laboratory.

---

## Results in Brief

Because Brookhaven employees did not aggressively monitor its reactor's spent-fuel pool for leaks, years passed before tritium contamination was discovered in the aquifer near the spent-fuel pool. Reliance on incomplete tests of the water level in the spent-fuel pool and on sample data from monitoring wells scattered about the site led Brookhaven and DOE officials to give low priority to a potential tritium leak. Even after laboratory and DOE staff agreed with Suffolk County regulatory officials to install monitoring wells near the reactor in 1994, Brookhaven officials postponed their installation in favor of environmental, safety, and health activities they considered more important. Once the wells were installed and high levels of tritium were discovered, the laboratory reported that the spent-fuel pool could have been leaking for as long as 12 years. Although the tritium poses little threat to the public,<sup>2</sup> Brookhaven's delay in installing the monitoring wells raised serious concerns in the Long Island community about (1) the laboratory's ability to take seriously its responsibilities for the environment and for human health and safety and (2) DOE's competence as an overseer of the laboratory's activities.

The responsibility for failing to discover Brookhaven's tritium leak has been acknowledged by laboratory managers, and DOE admits it failed to properly oversee the laboratory's operations. Brookhaven officials repeatedly treated the need for installing monitoring wells that would have detected the tritium leak as a low priority despite public concern and the laboratory's agreement to follow local environmental regulations. DOE's on-site oversight office, the Brookhaven Group, was directly responsible for Brookhaven's performance, but it failed to hold the laboratory accountable for meeting all of its regulatory commitments, especially its agreement to install monitoring wells. Senior DOE leadership also shares responsibility because they failed to put in place an effective system that encourages all parts of DOE to work together to ensure that contractors meet their responsibilities on environment, safety and health issues. Unclear responsibilities for environment, safety and health matters is a problem that has been tolerated by DOE management for years. However, DOE's efforts under way to address these issues are encouraging. DOE's latest strategic plan, submitted in support of the Government Performance and Results Act of 1993, offers an opportunity to focus attention on the need to address DOE's management structure and accountability problems from a strategic perspective.

---

<sup>2</sup>Because tritium decays rapidly, environmental experts (including the Environmental Protection Agency) have concluded that by the time the leak reaches the laboratory's boundary, its concentration will be below federal drinking water standards.

---

The Secretary of Energy's decision to terminate Associated Universities' 50 years as the laboratory's contractor was based, according to DOE's official statements, on the laboratory's loss of the public's trust and DOE's own investigation, which concluded that the laboratory had not kept pace with contemporary expectations for the protection of the environment and human health and safety. On the basis of our interviews with senior DOE leaders, including the Secretary, the Secretary appeared to rely heavily on information on Associated Universities' performance provided by his key staff, which included the Director of the Office of Energy Research, the Director of the Office of Nuclear Energy, Science and Technology, and the Assistant Secretary for Environment, Safety and Health. These officials expressed frustration with Associated Universities' performance and also with DOE's evaluation process, which they told us did not appear to reflect actual performance at the laboratory.

---

## Background

BNL conducts basic and applied research in a multitude of scientific disciplines, including experimental and theoretical physics, medicine, chemistry, biology, and the environment. BNL's fiscal year 1996 budget was about \$410 million. It employs about 3,200 people, including 900 scientists and engineers. As the operating contractor for BNL, AUI is responsible for day-to-day activities at the laboratory. Originally founded by nine universities, AUI has operated as a separate not-for-profit corporation since 1986.

DOE's Brookhaven Group and DOE's Chicago Operations Office managed BNL for the Department. DOE's Office of Energy Research is the principal headquarters' organization responsible for BNL-wide programs, infrastructure, and environment, safety and health (ES&H). However, other DOE program offices, including the Office of Nuclear Energy and the Office of Environmental Management, have significant responsibilities for activities at BNL, as does the Office of Environment, Safety and Health, which also monitors and evaluates the laboratory's activities.

At the local level, the Suffolk County Health Department is responsible for ensuring that BNL and private industries operating within the county do not contaminate the underground aquifer that provides the only source of drinking water for its 1.3 million residents. As a consequence of local citizens' sensitivity to possible contamination of the aquifer, the county has developed regulations that require underground tanks that contain potential contaminants to be lined to prevent the tanks from leaking. In 1987, after local hearings on chemical and radioactive releases at the

---

laboratory, officials representing the county health department, DOE, and BNL signed an agreement that the laboratory would meet the county's requirements and would strive to minimize contamination of the aquifer. The agreement also allowed county health department officials access to BNL to inspect facilities and to identify tanks and other facilities that did not adhere to the county's requirements.

The laboratory's High Flux Beam Reactor is the larger of the laboratory's two research reactors and is regulated by and must conform to standards that DOE and the Environmental Protection Agency (EPA) establish.<sup>3</sup> Although its main purpose is to produce neutrons for scientific experiments, the reactor's cooling water becomes contaminated with the radioactive element tritium during operations. Tritium has many uses in medicine and biological research and is commonly used in self-illuminating wrist watches and exit signs. However, tritium is a health concern if ingested or absorbed into the body in large quantities. The reactor's 68,000-gallon spent-fuel pool has high concentrations of tritium stemming from the reactor's operations. Built in the early 1960s, the reactor's spent-fuel pool is made of concrete but does not have a secondary containment, such as a stainless steel liner, to protect against possible leaks. Newer reactor fuel pools must have secondary containment systems to protect against such leaks.

In January 1997, the laboratory's analysis of water samples taken near the reactor revealed concentrations of tritium that greatly exceeded EPA's drinking water standards (some samples taken later were 32 times the standard). Laboratory officials attributed the leak to the reactor's spent-fuel pool. Although the tritium posed little threat to the public, a firestorm of public concern erupted because

- BNL had delayed until 1996 installing monitoring wells near the reactor despite a 1994 agreement by laboratory staff with Suffolk County officials to do so, and
- BNL officials reported that the tritium had probably been leaking for at least 12 years without the laboratory's or DOE's knowledge.

Shortly after the tritium levels were made public, DOE's Office of Oversight, which reports to the Assistant Secretary for Environment, Safety and Health, launched an investigation of the incident. On February 14, 1997, it released a report highly critical of both BNL's actions and DOE's oversight

---

<sup>3</sup>BNL also operates the Brookhaven Medical Research Reactor.

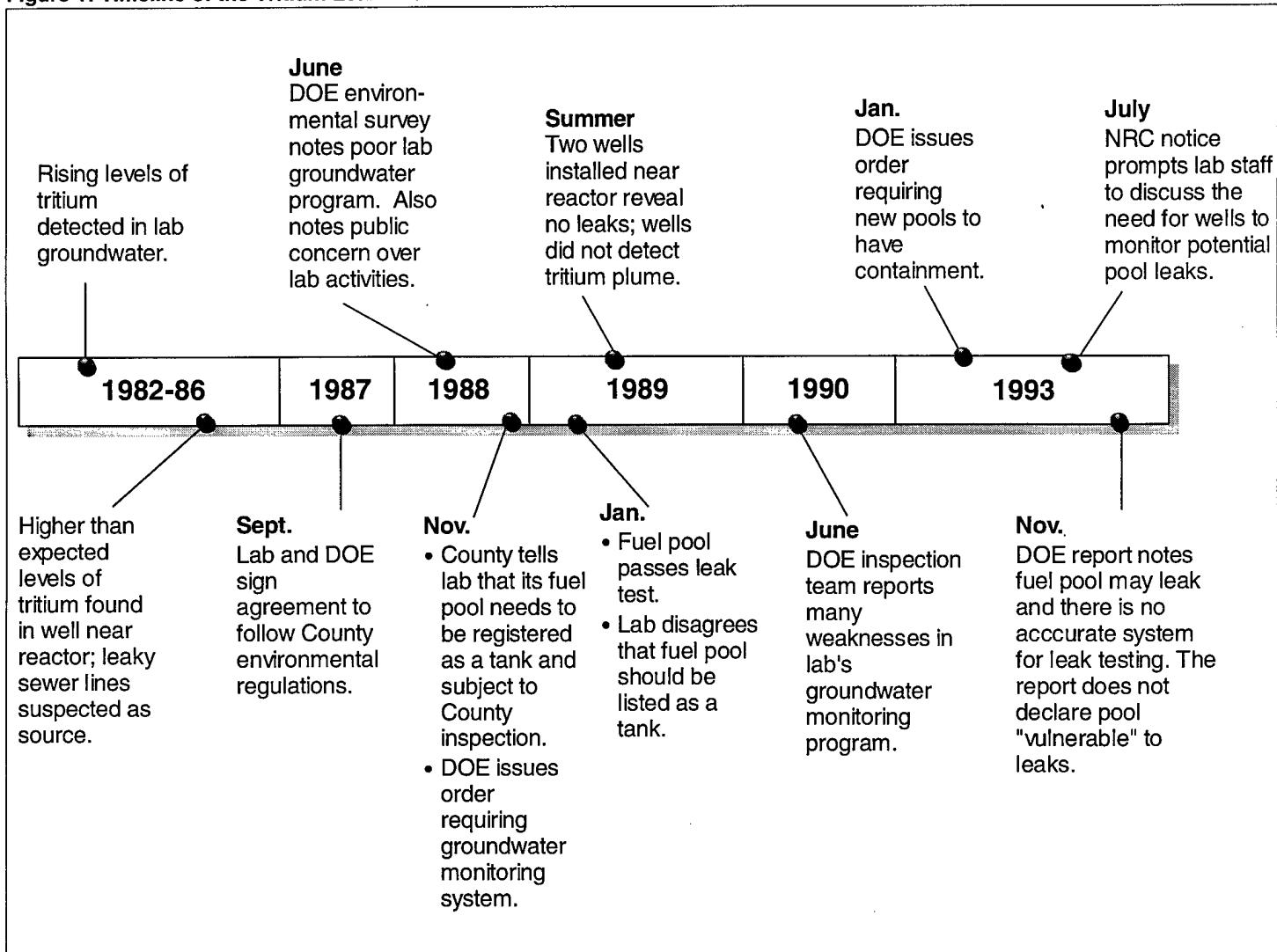
---

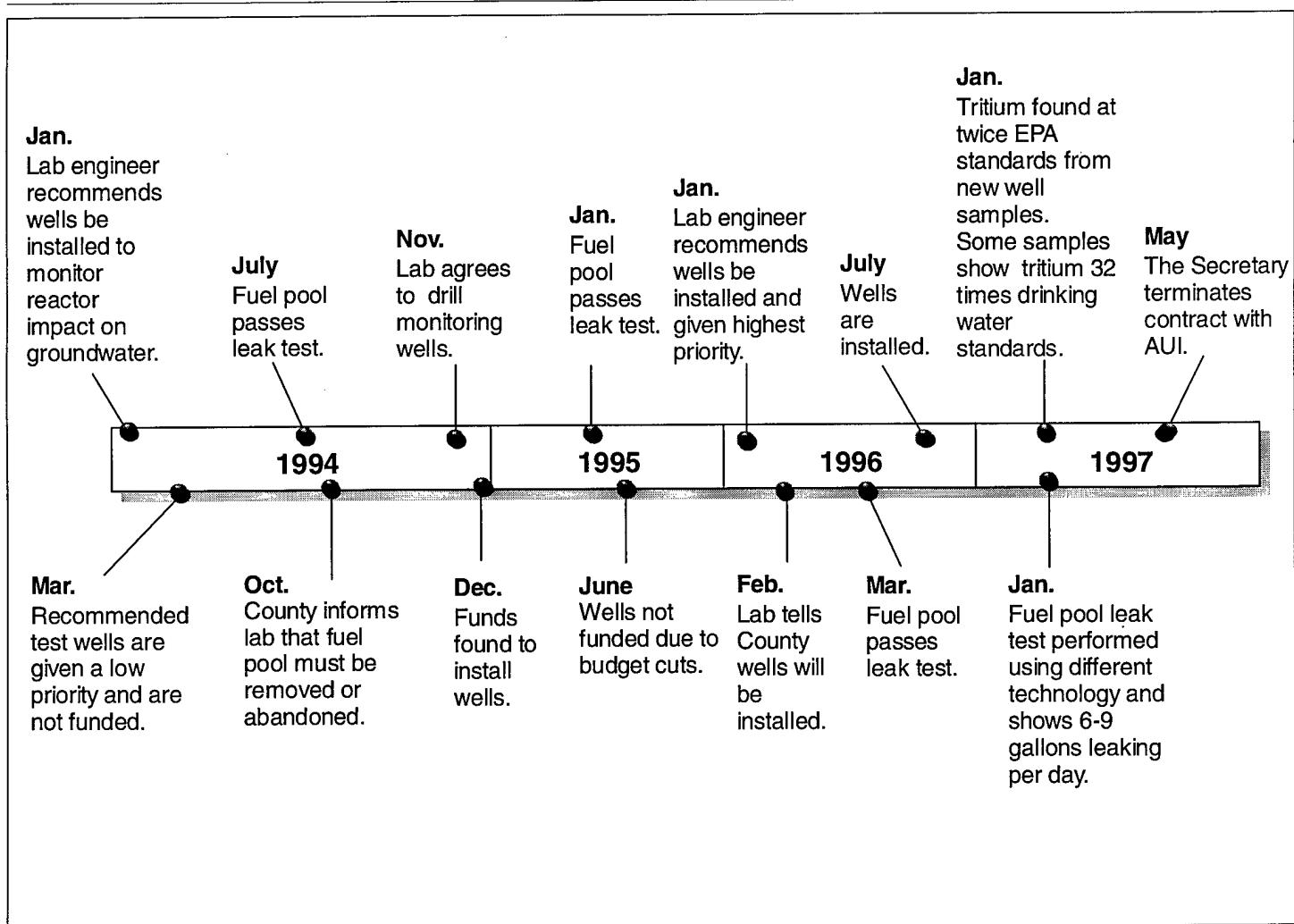
performance. A second report was issued in April 1997.<sup>4</sup> In addition, the Attorney General of New York State issued a report on October 16, 1997, which was critical of BNL's and DOE's environmental performance.<sup>5</sup> The Attorney General recommended that BNL's reactor remain idle until significant improvements are made in the laboratory's and DOE's environmental management practices.

---

<sup>4</sup>Interim Report on the Oversight of Groundwater Tritium Plume Recovery Activities at the Brookhaven National Laboratory. Office of Oversight, Office of Environment, Safety and Health, Dept. of Energy (Feb. 14, 1997). Integrated Safety Management Evaluation of the Brookhaven National Laboratory, Office of Oversight, Office of Environment, Safety and Health, U.S. Dept. of Energy (Apr. 1997).

<sup>5</sup>Vacco, Dennis C., Brookhaven National Laboratory: At the Crossroads (Oct. 16, 1997).

**Figure 1: Timeline of the Tritium Leak Events**



## Events Leading to the Discovery of Tritium in BNL's Groundwater

The series of events that led to the discovery of a tritium leak started in the mid-1980s when rising levels of tritium were first detected in groundwater on BNL. The key events are as follows:<sup>6</sup>

- Higher than expected levels of tritium were first discovered in a drinking water well about 500 feet from the reactor in 1986. BNL officials at the time reasoned that the tritium came from local sewer lines and did not suspect the reactor's spent-fuel pool as a source. Sewer lines were a known source of tritium. Tritium originated from condensation that forms inside the

<sup>6</sup>The events discussed below are drawn from DOE's Office of Oversight reports, internal laboratory documents, and from our interviews with current laboratory, DOE, and Suffolk County officials.

---

reactor building and eventually reached the laboratory's sewer system. No further samples were taken from this well, which was closed because of high levels of other nonradioactive contaminants.

- In 1987, DOE and BNL officials signed an agreement with Suffolk County which stated that the laboratory would conform to the environmental provisions of the county's sanitary code and allowed county officials to inspect BNL property for the first time.
- In 1988, Suffolk County, which was registering BNL's underground tanks for eventual regulatory compliance, told the laboratory that it wanted the reactor's spent-fuel pool listed as a tank. In 1989, BNL disagreed with the county's position. To allay the county's concerns, BNL said that the pool did not leak because it had successfully passed a leak test in 1989. BNL also said that two monitoring wells that were installed in 1989 near the reactor did not indicate any leaking from the reactor's spent-fuel pool. Although BNL officials later told us that the leak test was not accurate and that the two monitoring wells they installed earlier were in the wrong location to detect the tritium contamination,<sup>7</sup> BNL officials relied on these data as the basis for their confidence that the spent-fuel pool did not leak.

During the late 1980s, the laboratory was coming under increasing environmental scrutiny. A 1988 DOE environmental survey reported weaknesses in BNL's groundwater monitoring program and noted that local citizens were concerned about groundwater contamination at the laboratory. In 1989, the EPA listed BNL as a Superfund site because of an old landfill problem. New York State had listed BNL as a state Superfund site 3 years earlier. In 1990, a special DOE headquarters inspection concluded that BNL did not have an adequate groundwater monitoring program.

By 1993, BNL had begun discussing the need for additional monitoring wells near the reactor.

- In 1993, a BNL reactor official discussed with other BNL staff the need for additional monitoring wells near the reactor. This discussion was prompted by a Nuclear Regulatory Commission information bulletin that emphasized the need to monitor potential leaks from old equipment.
- Using BNL's data as support, a 1993 DOE report noted that the spent-fuel pool was not leaking.<sup>8</sup> The report also noted, however, that there was no reliable means of determining if the spent-fuel pool was leaking.

---

<sup>7</sup>These two wells were not intended to detect contamination from the reactor; they were installed as part of a broader effort to improve the laboratory's groundwater monitoring program.

<sup>8</sup>Spent Fuel Working Group Report, Office of Environment, Safety and Health, Dept. of Energy (Nov. 1993).

- In early 1994, a BNL engineer proposed that monitoring wells—at a total cost of \$15,000 to \$30,000—be drilled near the reactor, citing the reason as “good management practice.” The proposal was given a low priority by a team of BNL and DOE officials that reviewed environment, safety and health proposals. The well proposal did not rank sufficiently high, compared with other ES&H proposals, to receive funding. BNL officials continued to believe that the spent-fuel pool was not leaking.
- By late 1994, Suffolk County advised the laboratory that, under its regulations, the spent-fuel pool must be upgraded or abandoned. County officials told us that their demand on the laboratory to upgrade the spent-fuel pool was part of a general effort to upgrade all tanks that were still out of compliance with their sanitary code. The officials told us that they did not suspect that the spent-fuel pool was leaking. However, in their November quarterly meeting with Suffolk County, BNL and DOE staff agreed to install monitoring wells. The agreement was made at the staff level with no apparent senior management involvement in, or knowledge of, the agreement.

In late 1994, plans were begun for installing the monitoring wells. However, because of a subsequent budget cut, the wells were not funded. In early 1996, the wells were again approved for funding and were installed that July. The first samples from the new wells were taken in October and results returned in December. Additional samples were taken that month and were returned in January 1997. The additional samples reflected tritium levels far exceeding EPA’s drinking water standards. Further testing showed that an underground tritium “plume” of about 2,200 feet in length was coming from the reactor’s spent-fuel pool and had been developing for at least 12 years. On the basis of a new leak test, the pool was estimated to have been leaking from 6 to 9 gallons of tritium-contaminated water per day. The four previous leak tests in 1989, 1994, 1995, and 1996 had used less sophisticated measurement techniques that failed to show the leak.

---

## Senior Officials at All Levels Are Responsible for the Delays in Discovering the Tritium Leak

Responsibility for the conditions at BNL is shared among BNL, the Chicago Operations Office, the Brookhaven Group, and DOE headquarters managers. BNL treated the potential for a tritium leak as a low priority in the face of growing environmental concerns from the public and failed to follow through on its own commitments made by laboratory staff to local regulatory officials. DOE’s Brookhaven Group, which had line accountability over BNL activities, failed to hold the laboratory accountable for meeting its agreements with local authorities. Finally, DOE headquarters

---

shares responsibility for perpetuating a management structure with unclear responsibility for achieving ES&H objectives.

---

### BNL Treated the Reactor's Spent-Fuel Pool as a Low Priority

BNL officials told us they assigned a low priority to drilling the monitoring wells that could have detected the tritium leak because they believed that there was no urgency to the task. In reaching this conclusion, laboratory officials relied heavily on leak rate tests conducted by in-house personnel during 1989, 1994, 1995, and 1996 which indicated that the spent-fuel pool was not leaking. BNL officials acknowledge, in retrospect, that these tests were not carefully conducted because laboratory staff failed to accurately measure the spent-fuel pool's evaporation rate. Tests conducted after the tritium leak was discovered more accurately accounted for evaporation rates and concluded that the pool was leaking 6 to 9 gallons per day.

The officials who conducted the pool leak tests, who were part of the laboratory's reactor division, told us that they believed the tests were accurate because repeated tests produced the same results. Staff from the laboratory's safety and environmental protection division told us they did not question the reactor division's tests because of a high regard for its work.

However, the laboratory's own investigation of the tritium leak concluded that the laboratory's safety and environmental protection division should have placed more emphasis on assessing potential risk and should have questioned the reactor division on the accuracy of the test results.<sup>9</sup>

BNL officials also relied on well-sampling results to reinforce their position that the spent-fuel pool was not leaking, but these samples did not provide adequate coverage of the area surrounding the reactor where the spent-fuel pool was located. BNL officials relied on two wells that were installed southeast (in the general direction of the underground water flow) of the reactor in 1989. They were part of a group of 51 wells installed throughout the laboratory site in response to a need to improve BNL's groundwater monitoring program. BNL used the results from the two monitoring wells near the reactor as further evidence that the spent-fuel pool was not leaking because water samples from these wells did not identify the tritium leak. Laboratory officials told us, in retrospect, that they erred in using the results from these wells, which were not in the correct location to detect the tritium leak. They also told us that their

---

<sup>9</sup>Report of the Ad Hoc Committee on Environmental, Safety, and Health Decision Making at Brookhaven National Laboratory, Brookhaven National Laboratory (Apr. 29, 1997).

---

understanding of the hydrology at the site at the time led them to believe that the wells would adequately monitor the groundwater flow.

---

**DOE's and BNL's Actions in Connection With the Community's Concerns**

The intensity of the public's outcry following the announcement of the tritium leak was substantial, suggesting a lack of appreciation on the part of BNL in gauging the public's concern for environmental and public safety matters. Several factors suggest that the public's reaction could have been better anticipated. For example, Long Island residents have long been concerned with the quality of their drinking water and the potential harmful effects from laboratory-generated pollution. The county had been extensively monitoring for laboratory pollutants in the groundwater for years, and for tritium since 1979. Furthermore, DOE had been paying nearby residents' costs to switch from private wells to public water systems, a policy stemming in part from past groundwater chemical contamination coming from the laboratory and from other industrial sources.

DOE's Assistant Secretary for Environment, Safety and Health; the Director of the Office of Nuclear Energy, Science and Technology; and the Director of the Office of Energy Research all told us of their dissatisfaction with BNL's and the Brookhaven Group's inability to develop effective ways to maintain the public's trust. DOE's Office of Oversight officials, who have conducted reviews of many different DOE facilities—including three other laboratories—told us that compared to other DOE facilities, BNL was relatively slow in developing mechanisms to gauge changes in the public's attitude toward the laboratory. For example, DOE and BNL had not established a publicly accepted citizen advisory committee, such as DOE has done with some of its environmental restoration sites, and had not developed an effective strategy for anticipating the public's concerns.

---

**DOE and BNL Did Not Aggressively Oversee Their Environment, Safety and Health Commitments**

The Brookhaven Group did not aggressively monitor the laboratory's efforts to comply with an agreement made by laboratory staff to Suffolk County to install monitoring wells near the reactor. More rigorous attention to this agreement could have led to monitoring wells being installed more promptly. In their November 1994 meeting with Suffolk County officials, DOE and BNL staff agreed to install monitoring wells near the reactor. The agreement was made in response to Suffolk County's concern about the laboratory's progress in upgrading its many underground tanks (upgrading underground tanks was an important feature of the county's 1987 agreement with DOE and BNL). This agreement

---

was summarized in the minutes from the November 1994 meeting. The proposal to install the wells was reported in subsequent BNL project schedules, which were reviewed by BNL and DOE management.

The informality of the agreement to install monitoring wells made at the November meeting with Suffolk County officials had several important consequences. DOE and laboratory staff told us they did not track the laboratory's progress toward installing the wells. Also, because the agreements were made at the staff level and were documented only by informal notes, senior laboratory officials and DOE managers told us they were not aware that an agreement had been made. Thus, these managers lacked the information they needed to (1) gauge the relative importance of the staff's recommendations to install the wells and (2) use this information to adjust funding priorities, such as reallocating funding among laboratory programs.

Also, DOE has never completely reviewed the laboratory's progress in complying with the county's sanitary code, nor does it document its activities associated with county compliance issues. DOE has had a policy in place since 1994 that requires its staff to be accountable for "diligent follow-up and timely results from the commitments they make."<sup>10</sup> While DOE's fiscal year 1994 and 1995 performance appraisals of BNL noted laboratory progress toward complying with the county's sanitary code, they noted that more progress was needed. DOE headquarters, the Chicago Operations Office, and the Brookhaven Group conducted 48 evaluations of environment, safety and health related issues during fiscal years 1994 through 1996. However, the deputy manager of the Brookhaven Group told us that his office had never evaluated the laboratory's compliance with the county's requirements.

---

**DOE's Management Structure Provided Unclear Accountability**

Although the Brookhaven Group was directly accountable for BNL during the time the tritium leak went unnoticed, weaknesses in how environment, safety and health activities are budgeted and managed makes accountability unclear. There is no central budget for ES&H activities nor is responsibility clearly established for achieving ES&H goals. These weaknesses are the direct responsibility of DOE's senior leadership.

Many different headquarters program offices are responsible for environment, safety and health, and ground water monitoring activities:

---

<sup>10</sup>Public Participation, Dept. of Energy (DOE P 1210.1, July 29, 1994).

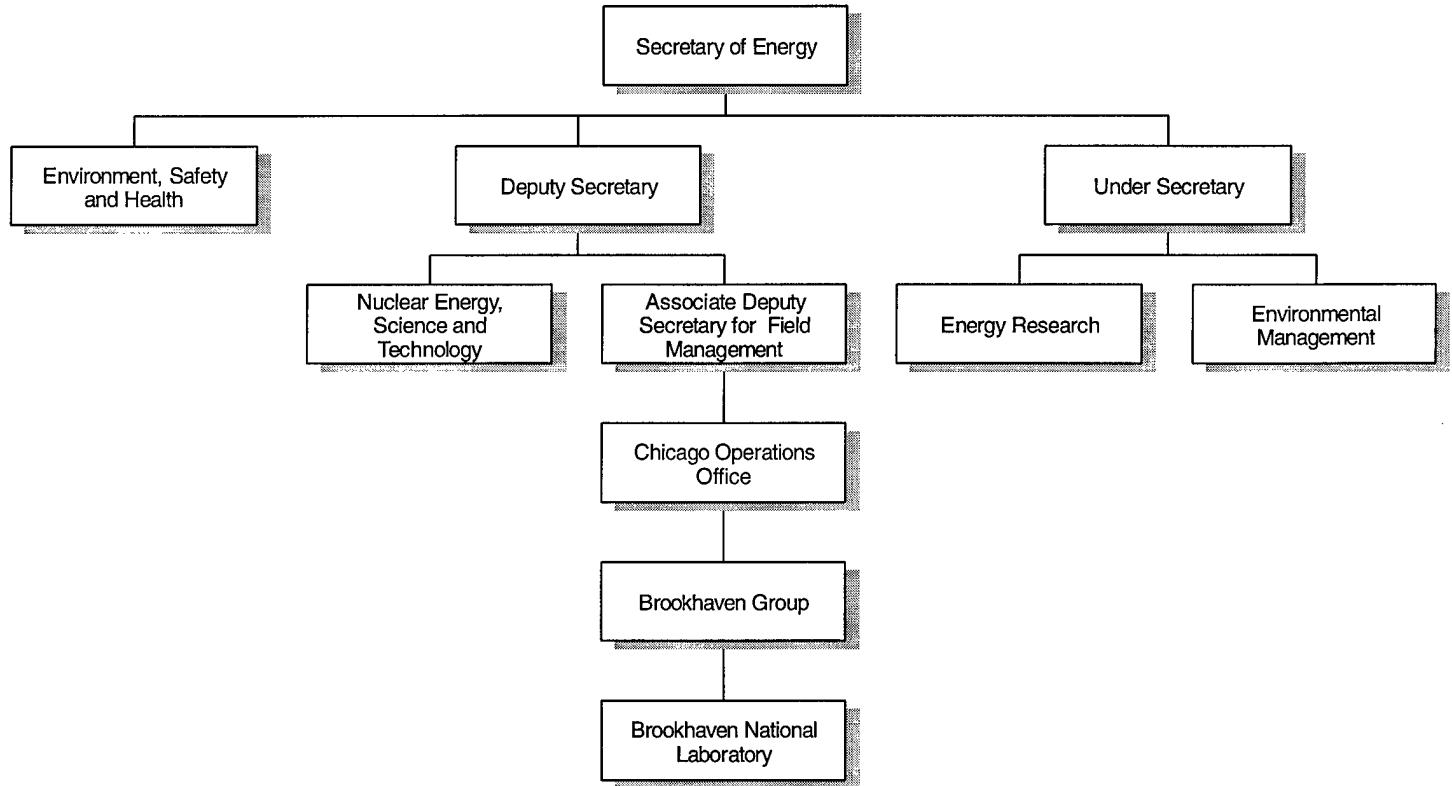
---

- The Office of Nuclear Energy, Science and Technology has primary headquarters responsibility for operating the reactor.
- The Office of Energy Research funds operations and scientific research at the reactor; it also provides most of the funds spent at the site and operates and maintains infrastructure and general environmental compliance activities, such as groundwater monitoring.
- The Office of Environmental Management also conducts groundwater monitoring as part of the site's cleanup activities; funds provided by this office are earmarked for its programs only.

The varying responsibilities of these headquarters offices contributes to an unclear pattern of funding at the laboratory level. For example, the monitoring wells could have been funded by BNL's (1) reactor division, which operates and maintains the reactor; (2) safety and environmental protection division, which manages an ES&H account derived from overhead funds; or (3) plant engineering division, which has an ES&H budget account. Plant engineering actually funded the monitoring wells because the reactor division staff did not believe it was their responsibility to pay for the wells—they wanted the safety and environmental protection division to pay for them.

DOE's complex organizational structure prevented effective accountability over the Brookhaven Group. As shown in figure 2, the Brookhaven Group was part of the Chicago Operations Office. Chicago reports to the Associate Deputy Secretary for Field Management, who is responsible to the Deputy Secretary. However, Energy Research is the "lead" program office at BNL and has direct responsibility over laboratory program activities, including environment, safety and health requirements. Yet this office reports to the Under Secretary, which is in a different chain of command. Completely outside of these chains of command is the Office of Environment, Safety and Health, which is an independent oversight office that has no direct line authority over the Brookhaven Group.

In commenting on a draft of this report, DOE noted that the Office of Energy Research was only responsible for ES&H oversight of those activities at BNL that it directly funded. Further, DOE commented that while the Office of Energy Research funded the reactor, the Office of Nuclear Energy, Science and Technology had principal headquarters responsibility for ES&H and that both the Chicago Operations Office and the Brookhaven Group had the primary role for ensuring ES&H performance. We believe that DOE's comments further illustrate the unclear accountability for ES&H at BNL.

**Figure 2: DOE's Organizational Units Relating to BNL**

DOE's unclear lines of authority with respect to ES&H matters is not a new issue. A 1993 DOE ES&H assessment team concluded in its review that headquarters program offices (Energy Research; Nuclear Energy, Science and Technology; and Environmental Management) "... do not integrate their efforts in resolving common ES&H issues .... Managers and staff are not clearly held accountable to ensure that ES&H programs are appropriately developed and are implemented in a formal and rigorous manner."<sup>11</sup> In its April 1997 report on BNL, DOE's Office of Environment, Safety and Health made similar observations, concluding that there is confusion in DOE headquarters about roles, responsibilities, and

<sup>11</sup>Environment, Safety and Health Progress Assessment of the Brookhaven National Laboratory, U.S. Dept. of Energy (Feb. 1993).

---

authorities, especially in connection with multiprogram laboratories.<sup>12</sup> The report cited a lack of clarity about the responsibility for ensuring the protection of workers and the environment in the operation of BNL.

DOE's management structure problems are long-standing:

- In its September 1997 report, DOE's Laboratory Operations Board cited inefficiencies that resulted from DOE's complicated management structure in both headquarters and the field and recommended that DOE undertake a "major effort" to rationalize and simplify its headquarters and field management structure to create a more effective line management.
- In October 9, 1997, testimony before the Congress, DOE's Inspector General cited confusion in DOE's management structure and recommended that DOE establish more direct lines of accountability for managing the national laboratories.
- A May 1995 DOE internal paper, prepared as part of the Department's Strategic Alignment Initiative, concluded that the lack of clear roles and responsibilities between headquarters and field units reduces authority, creates confusion and overlapping guidance, and reduces the linkage between performance and accountability.

We reported on unclear roles and responsibilities between headquarters and field offices in our 1993 report on DOE management issues.<sup>13</sup> In that report, we cited examples from DOE officials on accountability confusion caused by DOE's management structure.

The DOE Office of Oversight's report on BNL also noted a recent headquarters policy change that could further prevent field offices, such as the Brookhaven Group, from providing effective oversight of its contractors. The Office said that DOE should reconsider its direction, under contract reform, to reduce the oversight of contractors' environment, safety and health performance. The report also noted that while DOE's new policy is to rely more on "performance metrics," such an approach does not serve as an effective mechanism to monitor the contractor's day-to-day environment, safety and health performance.

---

<sup>12</sup>Integrated Safety Management of the Brookhaven National Laboratory, Office of Oversight, Office of Environment, Safety and Health, U.S. Dept. of Energy (Apr. 1997).

<sup>13</sup>Department of Energy: Management Problems Require a Long-Term Commitment to Change (GAO/RCED-93-72, Aug. 31, 1993).

---

**Weaknesses in Contractor Evaluation Process**  
**Weakened DOE's Ability to Oversee Activities**

DOE headquarters, the Chicago Operations Office and the Brookhaven Group all share responsibility for ensuring that the evaluation criteria used in AUI's contract reflect agreed-upon departmental priorities. DOE's performance measures for AUI did not reflect the priority that DOE espouses for ES&H, a condition which has further impacts on the ability of its Brookhaven Group to hold the contractor accountable for high standards of ES&H performance. Specifically, only 7.5 percent of DOE's performance evaluation criteria addressed BNL's ES&H activities in its 1996 contract. For its 1994 and 1995 annual appraisals of laboratory activities, ES&H criteria were not specifically identified, but were part of the "Environmental Compliance" and "Reactor Safety" rating elements, and were relatively minor aspects of each year's evaluation. DOE consistently rated AUI's performance on these ES&H related issues either "Good" or "Excellent." "Outstanding" was the highest available score.

Prior to 1996, AUI was not rated on public trust issues. For its 1996 performance contract, an element called "Communications and Trust" was added, along with "Environment, Safety and Health." The communications and trust element was given a 7.5 percent weight in the AUI evaluation criteria. AUI rated itself "Excellent" in both categories, but these scores were overridden by DOE to reflect "marginal" performance.<sup>14</sup>

DOE's Office of Oversight report noted that measurable ES&H performance elements are not incorporated into BNL managers' annual performance appraisals, nor are ES&H roles clearly delineated. The report also noted that some senior BNL line managers are focusing almost exclusively on scientific programs and are not being held accountable for ES&H. When we asked to examine the appraisals for BNL's senior manager responsible for making ES&H decisions, we were advised that these appraisals were not formally documented.

---

**DOE's Actions to Improve Oversight**

DOE acknowledges its management structure weaknesses. After the tritium leak was discovered in January, the Secretary eliminated the Chicago Operations Office from the reporting chain, having the Brookhaven Group report directly to headquarters. Also, DOE headquarters was heavily involved in technical decisions surrounding the tritium remediation activities and in responding to public concerns. In July 1997, DOE

---

<sup>14</sup>Performance criteria and self-assessments by the contractor were made part of AUI's performance contract for the first time in 1996.

---

completed its action plan for addressing issues relating to the tritium leak.<sup>15</sup> Its planned steps include

- better descriptions of environment, safety and health roles and responsibilities in DOE headquarters and field offices,
- establishing a corporate budget process for ES&H, and
- strengthening the Office of Energy Research's focus on ES&H as part of its lead responsibility to oversee BNL.

DOE's action plan also has measures for changing the ES&H "culture" at BNL and expanding community outreach. The plan proposes several other initiatives, such as a Headquarters-Brookhaven Management Council, chaired by the Director of the Office of Energy Research, to better coordinate activities at the laboratory and to ensure that DOE has a site-wide perspective on ES&H funding at the laboratory and other facilities. In commenting on a draft of this report, DOE provided additional details on their action plan and other corrective actions they have taken. See appendix I for DOE's letter.

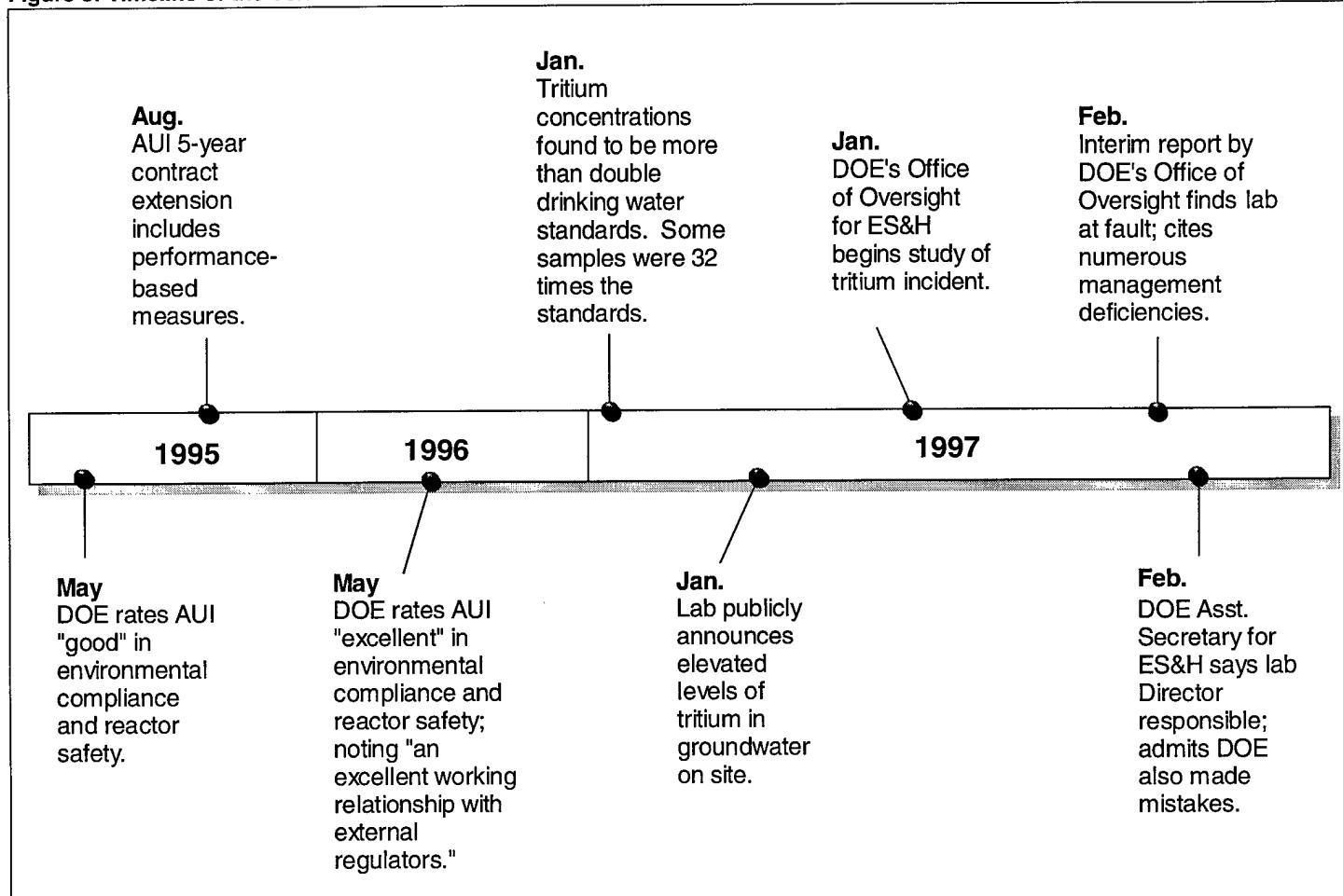
---

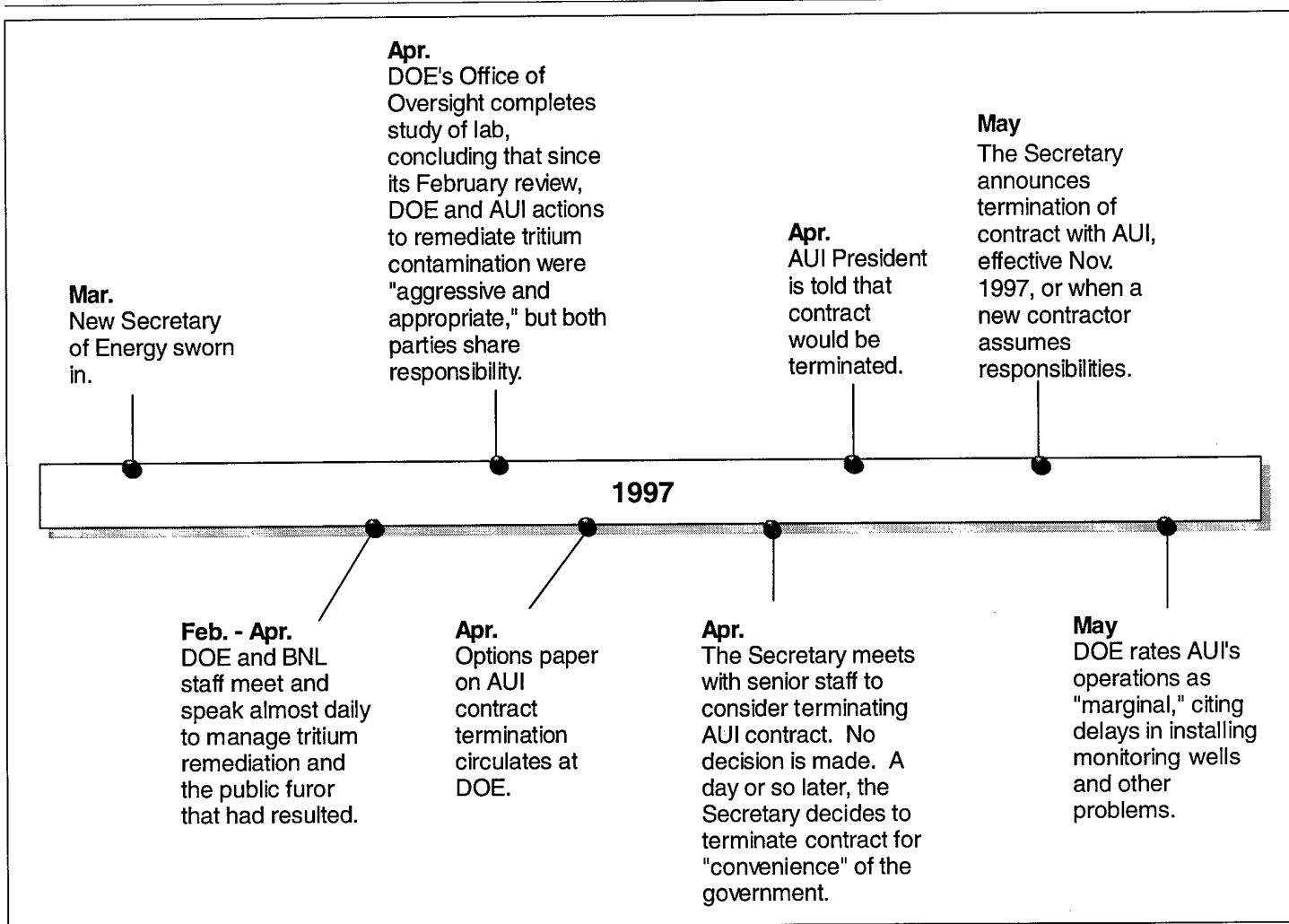
## The Decision to Terminate AUI Was Based on Performance and Loss of the Community's Trust

The Secretary of Energy took full responsibility for his decision to terminate DOE's contract with AUI as BNL's contractor. Although the Secretary has said that he received much technical and legal advice on his decision, he stressed that he ultimately terminated AUI for its lax environmental monitoring efforts and its breach of the trust and confidence of the Long Island community surrounding BNL. Figure 3 shows the chronology of events leading to the termination of AUI's contract.

---

<sup>15</sup>DOE Action Plan for Improved Management of Brookhaven National Laboratory, U.S. Dept. of Energy (July 1997).

**Figure 3: Timeline of the Termination of the AUI Contract**



## Early Discussions of AUI's Performance

The Secretary became involved in discussions of AUI with his senior staff as soon as he assumed office in mid-March of 1997. By this time, DOE had already shifted responsibility for remediating the tritium leak from the Chicago Operations Office and its Brookhaven Group to DOE's Assistant Secretary for Environment, Safety and Health, and officials were discussing the future of AUI. The Secretary told us that widely publicized criticism of AUI and DOE by elected officials did not influence his decision to terminate AUI's contract. Rather, he said he was moved by a growing frustration with AUI's technical competence when dealing with the tritium incident and with its public-relations consequences. All of the senior DOE participants we interviewed said that while the tritium leak itself posed no

---

serious health hazard, the public's perception of the way AUI managed the problem undermined the community's confidence in the laboratory.

---

### The DOE Office of Oversight's Reports

The Assistant Secretary for ES&H dispatched her Office of Oversight to examine the tritium situation in late January 1997. The results of this examination were a major influence on the Secretary's decision to terminate AUI's contract. The Office's Interim Report released on February 14, 1997, concluded that BNL "did not rigorously analyze the potential for [tritium] releases from the [reactor] and was somewhat overconfident in the control of effluent from [the reactor]." Many decisions were made "within lower levels of the BNL organization," and "senior managers were not sufficiently involved in the decision processes and may not have had all the information necessary to make good decisions about the priority of . . . monitoring [the reactor's spent-fuel pool]."

The Interim Report noted that both BNL's internal communications and communications among BNL, the Chicago Operations Office, and the Brookhaven Group "were not as effective as they should have been." Senior managers were not sufficiently involved in decisions and lacked necessary information, while both BNL and DOE showed "weaknesses" in their approach to such issues as management, planning, and priority setting. The Office of Oversight issued its second report on BNL in April 1997.<sup>16</sup> This report discussed the underlying causes of the tritium contamination.

---

### Loss of the Public's Trust Was the Dominant Factor in the Secretary's Decision

A major influence on the firing decision was the loss of the Long Island community's trust in BNL. Following the Interim Report's release, the Suffolk County Legislature held a public hearing on February 20, 1997, that further attracted press and public attention to the tritium contamination issue. The Assistant Secretary for ES&H told the hearing that, ultimately, BNL leadership was responsible for the tritium-leak problems,<sup>17</sup> although DOE itself had "made mistakes." Several Long Island residents expressed outrage at the way BNL had handled and publicized the incident. The Assistant Secretary for ES&H and the Director of the Office of Nuclear Energy, Science and Technology both told us that they were increasingly

---

<sup>16</sup>Integrated Safety Management Evaluation of the Brookhaven National Laboratory, Office of Oversight, Office of Environment, Safety and Health, U.S. Dept. of Energy (Apr. 1997).

<sup>17</sup>Suffolk County Legislature. Public Hearing. Brookhaven National Laboratory. February 20, 1997. Transcript, pp. 58-59.

---

frustrated by AUI's unresponsive dealings with the public, a complaint later emphasized by the Secretary.

Even before the Energy Secretary was sworn in on March 13, 1997, senior DOE officials were raising the possibility that AUI's contract might be terminated as a result of the tritium leak and its consequences. From late January 1997 on, the principal senior staff associated with the termination decision—the Assistant Secretary for Environment, Safety and Health, the Director of the Office of Energy Research, and the Director of the Office of Nuclear Energy, Science and Technology had all concluded that AUI's leadership was unable to deal effectively with the complaints and demands for decisive action from the local community.

---

#### An Options Paper Guided the Thinking of the Senior Staff

The DOE General Counsel's Office prepared a 10-page "options paper" during April although no signatures or dates appear on the copy provided to us. This memorandum, which DOE officials say fairly reflects the topics discussed by the Secretary and his senior staff, posed three general actions with several variations. The three main options were to (1) recompete the contract before its 1999 expiration date; (2) terminate the contract wholly or partially and select a new contractor; and (3) leave AUI in place but aggressively oversee its management. According to the Secretary's senior advisors, DOE had the choice between terminating the contract for "cause" or for "convenience" and decided on the latter to avoid a possible legal challenge by AUI over performance criteria. Until fiscal year 1996, AUI's annual performance appraisals had consistently reflected high ratings for its management of BNL, and its standards and conduct of environment, safety, and health matters, although rated lower, were "Good" or "Excellent." And as late as April 1997, DOE had concluded that although "continued attention is needed," current "DOE and BNL approaches to tritium contamination source resolution and remediation have been aggressive and appropriate."

But on Thursday, April 24, 1997, the Secretary held a final meeting with his senior staff to discuss their options for dealing with the AUI contract. They considered termination and its possible timing, noting that by postponing the actual firing for 6 months, DOE could avoid paying BNL employees severance pay. In commenting on a draft of this report, DOE said that by giving less than 6 months notice, there might be an obligation by DOE to pay BNL employees severance pay even in the almost certain event that they experienced no break in their employment at BNL when a new

---

contract was awarded. The group reached no conclusion, and a day or two later, the Secretary decided on his own to terminate the contract.

---

**The Decision to Terminate the AUI Contract Was Made by the Secretary**

On Thursday, May 1, 1997, the Secretary arrived at BNL and met with senior scientists, telling them about his decision to terminate AUI's contract and assuring them that he was not dissatisfied with their work but with the management of the laboratory. The Secretary said he based the decision on internal oversight reports and the unacceptable disintegration of the public's trust in the laboratory's management. Announcing his decision that day, he said, "I am sending a message to Long Island—and to our facilities nationwide—that I will take appropriate action to rebuild trust and to make environment, safety and health a priority."<sup>18</sup>

On May 16, 1997, DOE informed AUI that it would invoke an "override" provision of their contract and rate BNL's performance for fiscal year 1996 as "marginal" for operations. The Brookhaven Group's manager, who is the Contract Officer, attributed the lower rating to "significant events" that caused him to "look beyond mere mechanical application" of the annual rating procedure. Specific complaints included BNL's failure to "establish clear environmental, safety and health priorities . . ." and "honor [the] commitment to install groundwater monitoring wells around the High Flux Beam Reactor . . . within [the] agreed-to time . . .".

AUI's President vigorously protested this decision in a May 23, 1997, letter, complaining that "there is no public risk associated with the tritium plume." The letter also cited examples to remind DOE's Brookhaven Group that BNL had set priorities for its ES&H work. The Group's May 29 reply to a May 20, 1997, AUI letter protesting the rating stated that the "Department's decision was informed in part by numerous discussions between DOE senior managers and AUI management that occurred between January 1997 and the date of the Secretary's decision." The AUI President complained to the Group again in a June 9, 1997, letter stating that "AUI was not given the opportunity to discuss the initiatives and corrective actions that were underway." AUI had contended that it had been misled because "there were no discussions . . . that the Department was considering immediate termination and recompetition of the contract." Indeed,

"The Department's approval of the interim management team three days prior to its precipitous termination action led me to conclude that our corrective actions were

---

<sup>18</sup>"Secretary Pena Terminates Brookhaven Contract. Pena Says Step Necessary to Build Public Trust." DOE Press Release (R-97-032, May 1, 1997).

---

appropriate and effective and that we were making substantial progress in improving Safety Management and the relationships with the community."<sup>19</sup>

---

## Observations

Brookhaven officials consistently assigned low priority to the possibility of tritium contamination, despite public concern that the laboratory's operations might pollute Long Island's sole-source aquifer. BNL officials also gave inadequate attention to honoring local environmental regulations. DOE's resident oversight office, the Brookhaven Group, had direct responsibility for the laboratory's ES&H performance but failed to hold BNL officials accountable for meeting all regulatory commitments. Senior DOE leadership also failed by not creating an effective management and accountability system that would ensure that all offices of DOE and its contractors met their ES&H responsibilities.

DOE's planned actions for correcting oversight and management problems at BNL are promising steps that address many of the laboratory's current conditions. One of the most important planned actions is to clarify roles and responsibilities of all the organizations with accountability over BNL—especially the Office of Energy Research, the site's "landlord." Our concern is that role and responsibility weaknesses raised by DOE and summarized in this report reflect fundamental problems that have long characterized the Department's administration of all its national laboratories, not just BNL. For, despite many calls for improvement by internal and external groups, DOE leadership has so far been unable to develop an effective structure that can hold its laboratory contractors accountable for meeting all important departmental goals and objectives.

One hope for clarifying DOE's roles and responsibilities may be found in the Government Performance and Results Act of 1993 (Results Act), which offers DOE the opportunity to raise these issues to a strategic level. DOE's September 1997 Strategic Plan proposes success measures to "clarify ES&H roles and responsibilities" and to "annually monitor and report on ES&H expenditures and improve related internal controls." DOE's Strategic Plan is an integral part of the activities required to support the Results Act. GAO has been evaluating agencies' strategic plans and has been working with the Congress to help ensure that plans meet the Results Act requirements.

---

## Agency and Contractor Comments

We provided a draft of this report to DOE and Associated Universities, Inc., for review and comment. DOE generally agreed with our summary of the

---

<sup>19</sup>AUI had proposed an interim team to DOE for managing the laboratory and was awaiting DOE's approval. AUI's laboratory director had previously announced his retirement.

---

events surrounding the tritium leak. DOE also commented that we accurately stated that a major reason for the termination of Associated Universities' contract was the Long Island community's loss of confidence in Associated Universities. However, DOE said that we failed to discuss the other factors that contributed to the loss of public confidence in relation to the Secretary's decision to terminate the contract. DOE cites, for example, that past groundwater contamination by the laboratory was already a substantial environmental and community relations issue and that our report should have acknowledged this as a factor in the senior managers' recommendations to the Secretary on the issue of terminating the contract. We believe that our report adequately reflects that the community's concerns about the laboratory's past environmental contamination were raised in the community's conversations with the Secretary. Specifically, our report states that the Secretary ultimately terminated Associated Universities for its lax environmental monitoring efforts and its breach of the trust and confidence of the Long Island community. Also, as suggested by DOE, we clarified our report by including references to DOE's final Office of Oversight report.

DOE also described in more detail specific corrective actions it took after identifying its tritium leak and the broader steps it intends to take to improve management and oversight. Furthermore, DOE provided more details on its action plan, which was developed to address problems at both BNL and DOE. We added language in the report directing the reader's attention to these discussions.

Associated Universities generally agreed with our summary of the events surrounding the tritium leak. Associated Universities also pointed out that from February 1997 until the time of the Secretary's decision and beyond, DOE senior managers were responsible for the decisions made at BNL, not the BNL staff or Associated Universities. We made changes in the report to reflect this point. Associated Universities further stated its belief that, in matters affecting Associated Universities, the Secretary was poorly advised by his senior managers and that attempts to reach the Secretary to discuss his decision to terminate Associated Universities' contract were unsuccessful.

Associated Universities took exception to the draft report's statement that BNL officials gave inadequate attention to honoring local environmental regulations. We did not intend to imply that Associated Universities failed to honor all local environmental regulations. However, as our report discusses, BNL and DOE staff agreed with Suffolk County to install

---

monitoring wells but delayed their installation in favor of higher priority projects. Senior laboratory and DOE officials told us they were unaware of the agreement made by their staff to install these wells and the wells were not funded until much later. Both the laboratory and DOE were involved in several of the discussions about the decision to install monitoring wells, and we believe both must share the responsibility. Associated Universities also provided clarifying and technical comments, which we have incorporated as appropriate.

Appendices I and II include the full text of DOE's and Associated Universities' respective comments and our response.

---

As arranged with your offices, unless you publicly announce its contents earlier, we plan no further distribution of this report until 15 days after the date of this letter. At that time, we will send copies to the Secretary of Energy, the Director of the Brookhaven National Laboratory, and the Director, Office of Management and Budget. We will make copies available to other interested parties on request.

Our review was performed from June through October 1997 in accordance with generally accepted government auditing standards. See appendix III for a description of our scope and methodology.

If you or your staff have any questions about this report, please call me on (202) 512-3841. Major contributors to this report are listed in appendix IV.



Victor S. Rezendes  
Director, Energy, Resources,  
and Science Issues

---

# Contents

<b>Letter</b>		1
<b>Appendix I</b>		28
<b>Comments From the</b>	GAO Comments	36
<b>Department of Energy</b>		
<b>Appendix II</b>		37
<b>Comments From</b>	GAO Comments	42
<b>Associated</b>		
<b>Universities, Inc.</b>		
<b>Appendix III</b>		43
<b>Scope and</b>		
<b>Methodology</b>		
<b>Appendix IV</b>		45
<b>Major Contributors to</b>		
<b>This Report</b>		
<b>Figures</b>		
Figure 1: Timeline of the Tritium Leak Events		6
Figure 2: DOE's Organizational Units Relating to BNL		14
Figure 3: Timeline of the Termination of the AUI Contract		18

---

## Abbreviations

AUI	Associated Universities, Inc.
BNL	Brookhaven National Laboratory
DOE	Department of Energy
EPA	Environmental Protection Agency
ES&H	environment, safety and health
GAO	General Accounting Office
NRC	Nuclear Regulatory Commission



# Comments From the Department of Energy

Note: GAO comments supplementing those in the report text appear at the end of this appendix.

The page numbers in DOE's letter refer to a draft of this report. We have indicated page number changes only for those comments that we discuss in detail.

See comment 1.



## Department of Energy

Washington, DC 20585

October 30, 1997

Mr. Victor S. Rezendes  
Director, Energy, Natural Resources  
and Science Issues Division  
United States General Accounting Office  
Washington, D.C. 20548

Dear Mr. Rezendes:

We appreciate the opportunity to review and comment on the draft of the October 1997 GAO report "Information on the Tritium Leak and Contractor Dismissal at the Brookhaven National Laboratory", that you provided on October 24. The report covers the events surrounding the leak of tritium from the spent fuel pool of the High Flux Beam Reactor (HFBR) at Brookhaven National Laboratory (BNL), and the subsequent termination of Associated Universities, Inc. (AUI) as the management and operating contractor for the laboratory.

With the exception of specific items contained in the detailed page-by-page comments attached, the report is a generally accurate recounting of the events surrounding the tritium leak. It is incomplete, however, in addressing both the reasons for Secretary Peña's decision to terminate the AUI contract and the actions the Department has taken to correct management problems identified in the report and to restore public confidence in the Department's management of BNL.

The report accurately states that a major reason for the termination of AUI was the loss of confidence in AUI by the Long Island community. By focusing solely on the tritium release, however, it misses other important contributors to that loss of confidence, and to the decision to terminate the contract. For example, a major omission is the extent to which the potential for contamination of a sole source aquifer was already a substantial environmental and community relations issue. Although GAO suggests that past groundwater contamination should have lead to a more aggressive response by BNL and the DOE's Brookhaven Group, these considerations are not cited as factors in the recommendations of Senior Management nor the Secretary's decision. Similarly, GAO fails to acknowledge the findings in the final Office of Oversight report concerning the underlying causes of the tritium contamination and past contractor performance as having been a factor in these recommendations or the Secretary's decision.

---

**Appendix I**  
**Comments From the Department of Energy**

See comment 2.

In its conclusion, the draft report notes that GAO expects the Department's Strategic Plan and application of the Government Performance and Results Act to provide important opportunities for improvement of ES&H performance. While this is true, the draft report acknowledges neither the specific corrective actions taken by the Department in response to the problems at BNL, nor the broader actions taken to ensure greater accountability in ES&H and other areas. The Department has already taken several decisive actions to improve performance throughout the laboratory complex. These include implementation of performance-based contracting as part of the Department's Contract Reform Initiative and creation of the Laboratory Operations Board.

With regard to actions directed specifically at Brookhaven, the Secretary has directed the Brookhaven Group to report directly to Headquarters, and the Department is aggressively implementing the "DOE Action Plan for Improved Management of Brookhaven National Laboratory." That plan has the following major goals:

- to establish clear roles and responsibilities for DOE elements,
- to establish a corporate budget process for ES&H and infrastructure,
- to strengthen Energy Research's organizational focus on ES&H and laboratory operations,
- to fundamentally change and strengthen the ES&H culture at BNL,
- to expand community involvement, and
- to involve the local and scientific communities in deciding the fate of the HFBR.

We have made significant progress in realizing these goals. The Brookhaven Group now reports to the Secretary, and following award of the new contract it is expected that the Group will report to the Director of Energy Research. A Memorandum of Agreement defining the roles of all concerned Departmental elements after that transition has been drafted. A prioritized list of ES&H and infrastructure requirements for the laboratory has been prepared. The Office of Energy Research has been reorganized to form an Office of Laboratory Operations and Environment, Safety and Health. We are selecting a new management contractor, and the terms of the new contract for management of BNL will place a much greater emphasis on ES&H. Finally, the Department has initiated a broad outreach program to involve the local community, and this has already resulted in a substantial improvement in community relations. The most recent example of this is the agreement reached with Fish Unlimited, a local community group, to conduct an independent analysis of soil and water samples to help ensure the safety of the aquifer which provides the local community with its water.

---

**Appendix I**  
**Comments From the Department of Energy**

---

Thank you for the opportunity to comment on this draft report. If you have any questions concerning these comments, please contact me or have your staff contact Ben Weakley at 202-586-5430.

Sincerely,



Martha A. Krebs  
Director  
Office of Energy Research

Attachment

---

**Appendix I**  
**Comments From the Department of Energy**

---

**Detailed Comments on GAO's Draft Report**  
**"Information on Tritium Leak and Contractor Dismissal**  
**at the Brookhaven National Laboratory"**

See comment 2.

p. 4 GAO interviewed "program secretarial officers" but not all of those interviewed were Assistant Secretaries. Dr. Krebs is the Director of the Office of Energy Research (ER) and Dr. Lash is the Director of the Office of Nuclear Energy, Science and Technology (NE) (also see pp. 15, 27, 28, 35).

See comment 2.

p. 4 NE does not have significant program activities, per se. It oversees operation of the reactors, essentially for the Office of Energy Research (ER). NE does not provide reactor funding. Similarly, EH does not have significant program activities though it does, as indicated, periodically monitor and evaluate laboratory activities. Primary responsibility for DOE oversight of ES&H activities at Brookhaven resided with the Brookhaven Group and the Chicago Operations Office to which it reported.

See comment 2.

p. 5 The HFBR is not operated to produce tritium as the draft report implies. Tritium is a contaminant in the deuterium moderator and cooling water and is generated during reactor operation. Tritium is not recovered or "produced" at HFBR.

See comment 2.

p. 6 The report cites an EH Interim Report, but fails to cite the final April 1997 Office of Oversight Safety Management Evaluation Report, which is cited in Appendix I "Scope and Methodology" as having been reviewed by GAO and is included in Figure 3. It also fails to cite here the BNL report or U.S. EPA's review which also examined the causes and consequences of the tritium release.

See comment 2.

p. 10 There has been no leakage from the reactor itself. The leakage in question is from the spent fuel pool.

See comment 2.

p. 14 It should be clarified that past water hook-ups were as a result of VOC contamination, not tritium contamination. Although DOE is paying for these hook-ups, VOC contamination may not have been caused solely or primarily by laboratory operations as it is likely that off-site industrial activities contributed to the problem.

See comment 2.

p. 15 The report incorrectly designates Assistant Secretaries for Environment Safety and Health, Nuclear Safety, and Energy Research. There is only an Assistant Secretary for EH. The others are Office Directors. While there is an office of nuclear safety in EH, Dr. Lash is the Director of the Office of Nuclear Energy, Science and Technology.

See comment 2.

pp. 15-16 GAO general characterization concerning DOE and BNL officials as having "viewed" the laboratory's commitment on monitoring wells as "informal" suggests widespread knowledge of this commitment within DOE when this was

---

**Appendix I**  
**Comments From the Department of Energy**

---

See comment 2.

P. 17-19

not the case. It would be useful to identify which DOE and BNL officials GAO is citing.

See comment 2.

The wording used in this section of the draft report characterizes the "diffuse" management structure for Brookhaven as continuing, e.g. "DOE's Management Structure Diffuses Accountability." The Department has already made a number of changes to address this problem which are described in the transmittal letter including direct reporting by the Brookhaven Group to DOE Headquarters.

See comment 2.

The draft report also characterizes the fact that there is no central budget for ES&H activities as a weakness in achieving ES&H goals. The report states that "...these weaknesses are the direct responsibility of DOE's senior leadership." Lack of a central ES&H budget is not in and of itself a weakness. What is needed is a process for ensuring that necessary ES&H activities are identified, prioritized, and funded. The Office of Energy Research, the Brookhaven Group, BNL and the Office of Environmental Management are establishing a single, new prioritized process for determining infrastructure and ES&H funding requirements at Brookhaven. The Office of Energy Research will also be sending out guidance in the near future to other ER funded multi-program laboratories to establish similar procedures.

See comment 2.

The GAO draft report also implies that "budgeting" authority equates to management accountability. The Brookhaven Group and the Chicago Operations Office to which it reported, as well as laboratory management have primary responsibility for ensuring ES&H performance at the laboratory including recommendations for activities to be funded. Actions have been taken to establish direct reporting responsibility between the Brookhaven Group and Headquarters.

See comment 2.

The report states that "(m)any different headquarter program offices budget for environment, safety, and health activities..." and cites NE, ER, and EM. NE does not budget for ES&H activities at Brookhaven, nor do any other programs beside ER and EM. Costs associated with reactor operation are, in fact, budgeted by ER. Nonetheless, NE does have primary Headquarters responsibility for reactor operations.

See comment 3.

Now on p. 13.

p. 18-19

The report states that DOE's complex organizational structure prevents direct accountability over the Brookhaven Group. This is not correct. Prior to the Secretary's April announcement, the Brookhaven Group reported directly to the Chicago Operations Office and was directly accountable to the Chicago Operations

---

**Appendix I**  
**Comments From the Department of Energy**

Office.

See comment 2.

The report states that the Chicago Operations reports to the Associate Director for Field Management who is responsible to the Deputy Secretary. The head of Field Management is actually the Associate Deputy Secretary for Field Management.

See comment 3.

The report states that ER has direct responsibility over laboratory activities, including environment, safety and health requirements. At present, the Brookhaven Group reports directly to the Secretary. Beginning with the award of the new contract, the Brookhaven Group will report to the Office of Energy Research and specific organizational responsibilities for ES&H will be defined in a Memorandum of Agreement among the involved DOE organizations. Historically, ER was only responsible for oversight of those ES&H activities at BNL that it directly funded and for site-wide infrastructure. In addition, in the case of reactor operations, ER provided funding, but its oversight responsibilities were limited. NE had the principal HQ oversight responsibility. The Chicago Operations Office and its Brookhaven Group had the primary role for ensuring ES&H performance. Under the Action Plan developed by the Director of Energy Research, there will now be more direct review and oversight Brookhaven ES&H activities by ER, but this was not the case at the time covered by the report.

See comment 2.

The report also states in a related footnote that ER is responsible for administrative control over Chicago regarding the infrastructure needs at its contractor sites. ER did not, and does not, have administrative control over Chicago. ER provides funding and guidance on infrastructure associated with contractor-operated DOE laboratories whose contracts are administered by the Chicago Operations Office.

See comment 2.

The report also notes the Office of Environment, Safety and Health (EH) is outside of the chain of command associated with either Field Management through the Deputy Secretary or programmatic responsibility through the Under Secretary. The reason this office is not in the direct chain of command is that EH does not have direct management responsibility for ES&H performance within the Department. EH provides independent oversight, enforcement of Price-Anderson Act compliance, and technical assistance and policy guidance to the Department on ES&H matters. Line management is responsible for ES&H compliance and performance.

See comment 2.

p. 21

The report states that DOE Headquarters as well as the Brookhaven Group share responsibility for AUI's contract. GAO should include the Chicago Operations Office in this role. BHG reported to directly to Chicago Operations Office and not to DOE Headquarters until April, 1997. Chicago and its area office -- the Brookhaven Group -- had principal responsibility for contract administration and oversight of contractor performance.

---

**Appendix I**  
**Comments From the Department of Energy**

---

See comment 2.

pp. 22 & 28 GAO reports that DOE consistently rated AUI's performance positively. GAO is apparently referring to the annual laboratory appraisals. If so, this should be clarified since there are other evaluations and appraisals that are conducted of laboratory performance.

See comment 2.

p. 22 Chicago is no longer in the chain of command for the Brookhaven Group, which reports directly to the Secretary. The Chicago Operations Office provides technical and administrative support to the Brookhaven Group under a service agreement.

See comment 2.

p. 23 The draft report states that the "Secretary of Energy claims full responsibility for his decision to terminate..." the AUI contract. The Secretary takes responsibility for the decision. The use of the word "claims" carries additional connotations that the decision may not have involved other Department officials or that Secretary's authority to make such a decision was being contested by GAO or others.

See comment 4.

p. 24 The Department is unable to verify the statement attributed to the Assistant Secretary for Environment, Safety and Health in Figure 3 that the "Lab Director responsible."

See comment 2.

p. 26-27 The draft report states that "(i)n retrospect, the Secretary told us that widely publicized criticism of AUI and DOE by elected officials did not influence his decision to terminate AUI's contract." The use of the words "(i)n retrospect" suggests that at time of the decision the Secretary may have been so influenced. The words "(i)n retrospect" should be deleted.

See comment 2.

GAO cites the EH Interim Report, but not the findings of the final EH report which also factored into the recommendations of senior management and the Secretary, although the report was reviewed by GAO and is cited in Appendix I "Scope and Methodology."

See comment 2.

p. 27-28 As noted earlier, Dr. Lash is the Director of the Office of Nuclear Energy, Science and Technology. Similarly, there is no Assistant Secretary for Nuclear Energy and there is no "Director of Research." Dr. Krebs is the Director of the Office of Energy Research.

See comment 5.

p. 28 The source of the April 19, 1997 quote is not identified.

See comment 2.

pp. 28-29 The April 24 meeting is mischaracterized. The consensus of the views of the Senior Managers presented to the Secretary at the meeting was that AUI should be terminated. The purpose of the meeting was not to reach a conclusion, but to provide advice to the Secretary, which in fact it did. Additionally, the discussion of severance is incomplete. By giving less than 6 months notice, there might be an obligation by the Department to pay BNL employees severance even in the almost

---

**Appendix I**  
**Comments From the Department of Energy**

---

See comment 2.

p. 30

certain event that they experienced no break in their employment at BNL when a new contract was awarded. The GAO description suggests that BNL employees would have otherwise been entitled to severance payments.

See comment 6.

Now on p. 23.

p. 31

The draft report refers to DOE's inability to develop an effective structure to hold its laboratory contractors accountable. While the Department's management structure may have been imperfect, the Department nonetheless has held AUI -- its management and operating contractor at the Brookhaven National Laboratory -- accountable for its performance and actions such as this, in fact, help to overcome the imperfections of any accountability system by sending a signal from the highest levels of the Department that contractors will be held accountable.

See comment 2.

p. 35

As noted previously, the GAO interviewed "program secretarial officers", but not all of these were Assistant Secretaries. Dr. Krebs and Dr. Lash are Office Directors. Richard Hopf is the Deputy Assistant Secretary for Procurement and Assistance Management.

The following are GAO's comments on the Department of Energy's letter dated October 30, 1997.

---

## GAO Comments

1. We believe our report accurately reflects the reasons for the Secretary's decisions. Our report discusses the community's concerns about the laboratory's past environmental contamination and points out that these concerns were raised in the community's conversations with the Secretary. Specifically, our report states that the Secretary ultimately terminated Associated Universities for its lax environmental monitoring efforts and its breach of the trust and confidence of the Long Island community.
2. We have made changes to the report as appropriate in response to DOE's comments.
3. We believe our wording accurately reflects the conditions discussed. DOE's own investigation of the tritium leak sharply criticized the management structure and the associated unclear accountability throughout the Department's chain of command.
4. The source of this statement is the transcript for the public hearing held by the Suffolk County Legislature on February 20, 1997, pp. 58-59.
5. The source of this comment is the Integrated Safety Management Evaluation of the Brookhaven National Laboratory, Office of Oversight, Office of Environment, Safety and Health, U.S. Dept. of Energy (Apr. 1997); "Summary Assessment" of the "Status of Actions to Remediate the HFBR Tritium Plume," p. 13.
6. While we appreciate the reasons behind the termination of this particular contract, weaknesses in DOE's management structure persist. Terminating a contract, while "sending a signal" that "contractors will be held accountable" does not correct the Department's unclear management structure.

# Comments From Associated Universities, Inc.

Note: GAO comments supplementing those in the report text appear at the end of this appendix.

The page numbers in AUI's letter refer to a draft of this report. We have indicated page number changes only for those comments that we discuss in detail.

See comment 1.

OFFICE OF THE PRESIDENT 202/462-1676

**ASSOCIATED UNIVERSITIES, INC.**  
1400 16TH STREET, N.W., SUITE 730  
WASHINGTON, D.C. 20036

October 27, 1997

Mr. Victor S. Rezendes  
Director, Energy, Natural Resources, and  
Science Issues  
U.S. General Accounting Office  
Washington, DC 20548

Dear Mr. Rezendes:

On behalf of my colleagues at Associated Universities, Inc., I want to thank you for the opportunity to comment on the report on issues relating to the tritium leak at Brookhaven National Laboratory. We would like to commend you and your staff for an excellent summary of the rather convoluted technical, administrative and political issues which constituted this event. As might be expected there are several small matters where we believe changes should be made to improve accuracy or clarify understanding. We have transmitted a list of those proposed changes to you. I will devote my attention in this letter to those aspects of the report which we believe need further amplification to understand the developments fully.

In describing the DOE Secretary's decision process (page 28), the report indicates that he was "...moved by a growing frustration with AUI's technical competence when dealing with the tritium incident...". In fact, upon discovery of the tritium plume, BNL staff were mobilized quickly under the direction of the BNL plant engineering manager as team leader and developed a detailed action plan to deal with this event.

Almost immediately thereafter, senior officials from DOE headquarters took over all major decision-making at BNL. They replaced the BNL team leader with an engineer from another DOE site, took over all press releases and media contact, and dictated both policy and technical implementation to the BNL staff. Nevertheless, DOE subsequently implemented all elements of the plan already formulated by the BNL team leader.

It is quite clear to the staff of BNL that from the beginning of February, 1997 until the time of the Secretary's decision, and indeed for some time after that, the senior management of DOE was responsible for decisions made at BNL, not the BNL staff, and certainly not AUI.

CHARTERED IN 1946 AS AN INDEPENDENT, NON-PROFIT, SCIENTIFIC AND EDUCATIONAL INSTITUTION, AUI OPERATES BROOKHAVEN NATIONAL LABORATORY FOR THE DEPARTMENT OF ENERGY AND THE NATIONAL RADIO ASTRONOMY OBSERVATORY FOR THE NATIONAL SCIENCE FOUNDATION.  
FOUNDRY INSTITUTIONS: COLUMBIA UNIVERSITY, CORNELL UNIVERSITY, HARVARD UNIVERSITY, MASSACHUSETTS INSTITUTE OF TECHNOLOGY, PRINCETON UNIVERSITY, THE JOHNS HOPKINS UNIVERSITY, UNIVERSITY OF PENNSYLVANIA, UNIVERSITY OF ROCHESTER, YALE UNIVERSITY.

---

**Appendix II**  
**Comments From Associated Universities,**  
**Inc.**

Mr. Victor S. Rezendes

Page Two

October 27, 1997

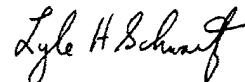
In this matter just described and in all other references to AUI, we believe that the Secretary was poorly advised by his senior managers. AUI was seriously concerned that the Secretary should hear its understanding of the events at BNL and AUI's plan of action. Indeed during April, 1997 direct approaches to the Secretary's office were tried, and indirect contacts were also explored. We were not granted an appointment. The Secretary made this decision for the first-ever termination of a national laboratory management and operating contract in 50 years of U.S. history with input limited to that from his own senior staff.

In commanding the DOE's action plan for changing the ES&H culture at BNL (page 23), the report fails to capture the role played by AUI in the development of this plan. During the months of May - June, 1997, acting as Interim Director of BNL, and coincidentally as President of AUI, I led the leadership of BNL in the development of a Management Systems Improvement Plan (MSIP) designed to address weaknesses in leadership, communications, and integrated safety management at BNL. Our MSIP was incorporated in its entirety by DOE into its plan for improvement of management of BNL and will now become the benchmark for whichever new contractor is selected to manage BNL. Far from justifying the Secretary's decision, the adoption of AUI's plan for improved management of BNL suggests strongly that the desired outcome could have been achieved by encouraging AUI in its role as manager of BNL, with far less cost to the Government and trauma to scientists at BNL, users of its facilities, and the scientific community in general.

See comment 2.

Finally, the report asserts, on page 30, that "BNL officials also gave inadequate attention to honoring local environmental regulations." The applicability of all local regulations upon a federal enclave is flatly the responsibility of the DOE. The DOE monitors and approves every jurisdictional agreement to ensure that it follows departmental policy. It also monitors and provides the funds for any activities undertaken under such agreements. This has created a natural tension for many years as evidenced by the continuing negotiations over spent-fuel shipments. BNL planners and prioritizers in ES&H programs must exercise their best judgments on the basis of known data in the framework of DOE controlled funding, DOE continuous oversight and approvals, EPA and New York State regulations and Suffolk County concerns. The oversight of the potential political impact of a leak at the spent-fuel pool was a serious mistake but it does not reflect on BNL's honest attempts to respond to Suffolk County regulations.

Sincerely,



Lyle H. Schwartz  
President

**Appendix II  
Comments From Associated Universities,  
Inc.**

**October 27, 1997**

**Comments of Associated Universities, Inc.**

**GAO Draft Report to Congressional Requesters - GAO/98-26**

**Department of Energy —  
Information on the Tritium Leak and Contractor Dismissal  
at the Brookhaven National Laboratory**

See comment 1.

p. 1, para. 1, line 2: "...from a research reactor..." should read "...from the fuel element storage pool at a research reactor..." as accurately stated at the end of that same paragraph.

See comment 1.

p. 1, para. 2, line 1: "DOE's investigation..." should read "DOE's and BNL's investigation..." since the technical work for this investigation was carried out by BNL staff and their consultants.

See comment 1.

p. 2, para. 2, line 3: "Reliance on crude tests..." should read "Reliance on tests with insufficient accuracy..." since the tests were actually very precise (same answer each time), but inaccurate.

See comment 3.

p. 2, para. 2, line 6: "Even after laboratory ....considered more important." should read "Laboratory officials agreed in 1994 with Suffolk County regulatory officials to monitor 69 underground tanks, including the storage pool near the reactor. Installation of monitoring wells at the storage pool was assigned relatively low priority and was not completed until late 1996."

See comment 1.

p. 2, para 2, line 8: "...in favor of activities..." should read "in favor of other ES&H activities..." since these were the trade-offs being evaluated by the priority-setting committee.

See comment 4.

p. 2, para. 2, line 11: "...poses little threat..." should read "...poses no threat."

See comment 1.

p. 4, para 2, lines 3 and 4: "...about \$485 million." should read "...about \$410 million.;" "...about 3,500..." should read "...about 3,200..."; and "...1,250..." should read "...approximately 900..."

See comment 1.

p. 4, para 2, line 6: Delete sentence beginning "Originally created..." and replace with : " AUI is a non-profit corporation founded in 1946 by nine northeastern Universities for the express purpose of creating and managing BNL." AUI was never a consortium.

See comment 1.

p. 5, para 1, last line (line 13): "might be leaking." should read "...might not meet county code."

See comment 1.

p. 5, para 2, line 1: "...Reactor is its..." should read "...Reactor is one of its two research reactors..." since BNL also operates a small research reactor used for medical experiments.

Appendix II  
Comments From Associated Universities,  
Inc.

See comment 1.

p. 6, para 1, first bullet: The statement that "BNL admitted that the tritium..." is very misleading. It implies that BNL had earlier knowledge of the leak. A better statement would be that "BNL officials concluded that the leak could have existed for 12 years or longer based on the distance that the plume had traveled."

See comment 1.

p. 7, 1982-86: "Unexpectedly high level of tritium..." should read "Low but unexpected levels of tritium...." since these observations were of tritium levels far below drinking water standards levels.

See comment 5.  
Now on p. 6.

p. 7, 1989, Jan.: "Lab disagrees..." should read "BNL and DOE disagree with Suffolk County..." since this issue of jurisdiction and definition was jointly pursued by the laboratory and the department. The Department had the final authority.

See comment 1.

p. 7, 1993, Jan.: There is no reference made to this item in the text. It is our understanding that this order related to new construction and was to be applied retroactively to existing facilities only under conditions of major upgrade. Therefore it has no relevance to the subject at hand and should be deleted.

See comment 1.

p. 7, 1993, Nov.: "...for leak testing and report does not declare..." should read "...for leak testing but report does not declare..."

See comment 1.

p. 9, para 1: The first paragraph comments on ... "rising levels of tritium were first detected in a drinking water well....and adjacent private property" implying a connection between the HFBR tritium leak and off-site contamination. The only off-site contamination observed in the mid 1980's was in areas near the sewage treatment plant, which had no association with the HFBR spent fuel pool leak. A more accurate statement for the first paragraph would be: "A series of events that play a part in the history of the BNL tritium leak started in the mid 1980s when tritium was detected in an on-site potable well."

See comment 3.  
Now on p. 7.

p. 9, bullet 1: While accurate as far as it goes, this paragraph fails to mention that BNL immediately took aggressive action to repair the sewer lines to address the problem they posed.

See comment 1.

p. 9, bullet 1, last line: The words "non radioactive" should be inserted before "contaminants" so that the line reads "...due to high levels of other, nonradioactive contaminants."

See comment 1.

p. 10, para 1, line 4: "...acknowledge that..." should read "acknowledge with hindsight that ... leak test was not sufficiently accurate..." since the impression may be drawn from the present phrasing that BNL officials recognized these deficiencies at some time past and did nothing.

See comment 3.  
Now on p. 9.

p. 11, last bullet, lines 9 and 10: "...to install monitoring wells." should read "...to install monitoring wells at 69 underground tanks, including the HFBR spent fuel pool."

See comment 6.  
Now on p. 9.

p. 11, last bullet, last sentence: Delete sentence beginning with "The agreement was made.... and substitute with "This broad agreement was known of by cognizant divisions and discussed with the Laboratory Directorate."

Appendix II  
Comments From Associated Universities,  
Inc.

See comment 1.

See comment 3.  
Now on p. 11.

See comment 1.

See comment 1.

See comment 1.

See comment 7.  
Now on p. 19.

See comment 7.  
Now on p. 21.

See comment 1.

p. 14, last paragraph, last line. Add the words "by chemicals" to the end of sentence so sentence reads "...laboratory groundwater contamination by chemicals."

p. 15, para 2, line 4: "In their November... near the reactor." should read "In November 1994 at a meeting with Suffolk County officials, DOE and BNL staff agreed to install monitoring wells at 69 underground tanks throughout the BNL site, including the spent fuel pool at the HFBR."

p. 16, para 2: This paragraph is not accurate. Laboratory officials and DOE managers did know about the general agreement to monitor underground tanks, but since the spent fuel pool had not in any manner been singled out in that agreement, they lacked the specific knowledge "...needed to (1) gauge.... to install the wells near the HFBR and (2)...."

p. 17: Starting with the second paragraph (which begins "Many different headquarters program offices budget for environment, safety and health activities...."). This is an inaccurate representation. The Office of Nuclear Energy provides no budget for the reactor nor any of the costs for operating and maintaining the site's infrastructure; the Office of Environmental Management conducts groundwater investigation but does not provide funding for environment, safety and health.

p. 25, 1997, Mar.-Apr.: "DOE and AUI meet..." should read DOE and BNL staff meet..." since AUI corporate staff met only infrequently with DOE during this period and primarily on issues relating to the appointment of interim leadership for the laboratory as Director Samios' retirement on Apr. 30 approached.

p. 25, 1997, May: "DOB rates AUI's operation as "marginal"..." should read "DOE revises its previous "excellent" assessment of AUI's 1996 performance rating to "marginal." Statements made by DOE to AUI prior to February, 1997 clearly indicated their intention to rate operations for 1996 as "excellent". This same issue is referred to on pages 28 and 29.

p. 28, para 2, line 11: "Until fiscal year 1996..." would more accurately represent the situation if phrased: "Including its provisional rating for fiscal year 1996, AUI ..." since, as noted above, the DOE felt it necessary to revise previous ratings for fiscal 1996 after the tritium plume was discovered during fiscal 1997. This sequence is accurately portrayed on p. 29, para 3, which, however, fails to note that the override reduced a prior "excellent" rating for all operations to a "marginal" rating.

p. 34, 8 lines from bottom "...we interviewed the interim president..." should read: "...we interviewed the president, who had also briefly served as interim laboratory director, the..." since the reference appears to refer to Dr. Schwartz, the AUI President.

  
Lyle H. Schwartz  
President, Associated Universities, Inc.

---

The following are GAO's comments on the Associated Universities letter dated October 27, 1997.

---

## GAO Comments

1. We have made changes to the report, as appropriate, in response to AUI's comments.
2. We did not intend to imply that Associated Universities failed to honor all local environmental regulations. However, as our report discusses, BNL and DOE staff agreed with Suffolk County to install monitoring wells but delayed their installation in favor of higher priority projects.
3. We believe our wording accurately reflects the events discussed. We did not evaluate the laboratory's compliance with other underground tanks.
4. We believe our wording accurately reflects the events discussed. EPA officials have advised us that while the tritium contamination poses little or no threat today, its long-term consequences are not certain.
5. We believe our wording accurately reflects the events discussed. BNL's January 20, 1989, memorandum rejecting the county's position does not indicate DOE's involvement.
6. We believe our wording accurately reflects the events discussed. The "broad agreement" mentioned by AUI was made in 1987. The paragraph in our report describes events that occurred in 1994.
7. As we stated in our report, the "Excellent" rating mentioned by DOE prior to February 1997 referred to AUI's self-assessment.

# Scope and Methodology

To identify the events and decisions leading up to the discovery of the tritium leak at Brookhaven National Laboratory (BNL) and the causes of these events, we began our work by reviewing three major studies completed by the Department of Energy (DOE) and BNL. These included the DOE Office of Oversight's February 1997 interim report on the tritium recovery efforts at the laboratory, the Office's April 1997 final report on BNL, and the laboratory's April 1997 report on environment, safety, and health decision-making. To improve our understanding of the matters discussed in these reports, we (1) interviewed the authors and staff of each study, (2) obtained and reviewed documents and studies discussed in the reports, and (3) discussed the results of the studies with officials from the numerous organizations involved in the tritium situation. For example, within DOE we interviewed Office of Environment, Safety and Health officials who had evaluated the tritium recovery effort and safety management processes at the laboratory; the Chicago Operations Office manager and staff who were responsible for overseeing activities of DOE's local Brookhaven office (the Brookhaven Group) during the early 1990s; and officials of DOE's Brookhaven Group who administered DOE's contract with AUI and who reviewed the laboratory's reactor, ES&H, and groundwater monitoring programs. At Associated Universities, Inc. (AUI), we interviewed the president, the former and the current laboratory director, and the vice president responsible for ES&H activities. We supplemented the information obtained during these meetings by interviewing the BNL associate director and staff responsible for operating the High Flux Beam Reactor and its spent-fuel pool and for implementing groundwater monitoring and other ES&H programs at the site. We also interviewed officials from other organizations who regulate aspects of the laboratory's environmental efforts or its compliance with local environmental laws. These included officials from the Region II office of the U.S. Environmental Protection Agency, the Suffolk County Department of Health Services, and the state of New York's Office of the Attorney General.

To determine the reasons used by DOE to terminate its contract with AUI, we reviewed the Department's press release and the public statements made by DOE's Secretary and other officials concerning the termination decision. We then interviewed the Secretary of Energy to obtain his perspective on the decision and the options that he considered to improve the laboratory's performance. We also interviewed DOE's Assistant Secretary for ES&H, the Director of the Office Energy Research, and the Director of the Office of Nuclear Energy, Science and Technology. These were the senior departmental managers responsible for laboratory

---

**Appendix III**  
**Scope and Methodology**

---

activities. We also interviewed the Department's Deputy Assistant Secretary for Procurement and Assistance Administration, and DOE's manager of the Brookhaven Group to determine the information that these officials provided to the Secretary concerning AUI's performance and the options available to address the tritium situation. We supplemented this information by reviewing DOE's evaluations of AUI's performance prepared for fiscal years 1991 through 1996 and a DOE memorandum that summarized the options presented to the Secretary for dealing with AUI.

Throughout our work, we verified the accuracy of key information by obtaining supporting documentation and by questioning apparent inconsistencies or gaps in the information presented. However, as agreed with the Committee's staff, we did not use investigative techniques or authorities to verify that officials we interviewed provided us with all documents relevant to the tritium leak and the termination of the AUI contract.

# Major Contributors to This Report

---

Gary Boss, Project Director  
Michael E. Gilbert, Project Manager  
Robert P. Lilly, Deputy Project Manager  
William Lanouette, Senior Evaluator  
Duane Fitzgerald, Technical Advisor  
Jackie Goff, Senior Attorney

---

### Ordering Information

The first copy of each GAO report and testimony is free. Additional copies are \$2 each. Orders should be sent to the following address, accompanied by a check or money order made out to the Superintendent of Documents, when necessary. VISA and MasterCard credit cards are accepted, also. Orders for 100 or more copies to be mailed to a single address are discounted 25 percent.

**Orders by mail:**

**U.S. General Accounting Office  
P.O. Box 37050  
Washington, DC 20013**

**or visit:**

**Room 1100  
700 4th St. NW (corner of 4th and G Sts. NW)  
U.S. General Accounting Office  
Washington, DC**

**Orders may also be placed by calling (202) 512-6000  
or by using fax number (202) 512-6061, or TDD (202) 512-2537.**

**Each day, GAO issues a list of newly available reports and testimony. To receive facsimile copies of the daily list or any list from the past 30 days, please call (202) 512-6000 using a touchtone phone. A recorded menu will provide information on how to obtain these lists.**

**For information on how to access GAO reports on the INTERNET, send an e-mail message with "info" in the body to:**

**info@www.gao.gov**

**or visit GAO's World Wide Web Home Page at:**

**<http://www.gao.gov>**

United States  
General Accounting Office  
Washington, D.C. 20548-0001

Bulk Rate  
Postage & Fees Paid  
GAO  
Permit No. G100

Official Business  
Penalty for Private Use \$300

Address Correction Requested

